

CLAIMS

1. A minimally invasive therapeutic agent delivery system for treating macular degeneration, said system comprising:
 - a reservoir comprising a therapeutic agent for dissolving lipid waste deposits in at least Bruch's membrane;
 - an elongate probe, wherein said probe:
 - defines a passage therein;
 - is configured to conform at least in part to the curvature of the eye;
 - has a proximal probe end and a distal probe end including a distal probe opening;
 - a therapeutic agent delivery apparatus, said therapeutic agent delivery apparatus being:
 - fluidly connected to said reservoir;
 - configured to be disposed within said passage; and
 - movable between a retracted inoperative position within said probe and an extended operational position when said distal probe end is disposed adjacent the sclera of an eye suffering from macular degeneration

wherein movement of said delivery apparatus from the inactive to the operational position enables the therapeutic agents to be dispensed from said reservoir through said distal probe opening into the eye for the treatment of macular degeneration.
2. The system of claim 1 and further including a handle attached to said probe proximal end.

3. The system of claim 1 and further including a handle attached to said probe proximal end, wherein said reservoir is attached to said handle.
4. The system of claim 1 wherein said therapeutic agent delivery apparatus comprises an elongate needle.
5. The system of claim 4 wherein said probe distal end includes an eye-surface engaging surface configured to conform to the surface of the eye.
6. The system of claim 5 wherein said probe passage includes a portion conforming to the surface of the eye and a portion that angles toward the eye such that said distal probe opening is in said eye-surface engaging surface.
7. The system of claim 5 wherein said passage bends said needle when said needle is moved from its retracted to its extended position.
8. The system of claim 1 wherein said probe includes a probe positioning portion at said distal probe end for engaging the optic nerve and positioning said distal probe opening relative to the fovea of the eye.
9. The system of claim 1 wherein said therapeutic agent delivery apparatus comprises an array of micro-needles.
10. The system of claim 9 wherein said probe houses a spring within said passage, said spring being provided for moving said array from its inoperative position to its operative position.

11. The system of claim 9 wherein said array is movable between retracted and extended positions by a spring.
12. The system of claim 1 wherein said therapeutic agent delivery apparatus comprises a porous pad.
13. The system of claim 12 wherein said pad is movable between operative and inoperative positions by a spring.
14. The system of claim 1 wherein said therapeutic agent delivery apparatus comprises a plurality of porous pads and at least one conductive pad, said porous pads being electrically connected to the negative electrode of a power source and said conductive pad being electrically connected to the positive electrode of a power source, said electrical connections being provided to enhance diffusion of the therapeutic agent into the eye.
15. A method for treating macular degeneration comprising:
 - providing a reservoir of at least one therapeutic agent for dissolving lipids in Bruch's membrane;
 - providing an elongate probe configured to engage the surface of the eye in the proximity of the optic nerve;
 - providing a therapeutic agent delivery apparatus for delivering the therapeutic agent to the sclera;
 - placing the elongate probe in position to deliver the therapeutic agent to the eye;
 - and
 - delivering the therapeutic agent to the sclera.

16. The method of claim 15 wherein the therapeutic agent is lipase.
17. The method of claim 15 wherein the therapeutic agent is a solution of lipase and at least one therapeutic agent selected from calcium chloride, bile salts, and albumin.
18. The method of claim 15 wherein the therapeutic agent is a solution of lipase and a detergent for binding free fatty acids released by the lipase.
19. The method of claim 15 wherein said therapeutic agent is injected into the sclera.
20. The method of claim 15 wherein said therapeutic agent is diffused into the sclera.
21. The method of claim 20 wherein the diffusion of the therapeutic agent into the sclera is enhanced by iontophoresis.
22. The method of claim 15 wherein the elongate probe includes a therapeutic agent dispensation opening for providing the therapeutic agent to the eye.
23. The method of claim 22 wherein the elongate probe includes a probe positioning portion for positioning the therapeutic dispensing opening in close proximity to the fovea.
24. The method of claim 15 wherein therapeutic agent delivery apparatus is movable between inoperative and operative positions for delivery of the therapeutic agent.
25. The method of claim 24 and further including maintaining the therapeutic delivery apparatus in the inoperative position until the probe is disposed relative to the eye for delivery of the therapeutic agent.

26. The method of claim 25 and including disposing the therapeutic delivery apparatus in an operative position for delivery of the therapeutic agent and further including disposing the therapeutic delivery apparatus in the inoperative position for withdrawal of the probe relative to the eye.